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# A Hydrometeorological Assessment of the Historic 2019 Flood of Nebraska and Iowa

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During early 2019, a series of events set the stage for devastating floods in eastern Nebraska and western Iowa. When the floodwaters hit, dams and levees failed, leaving towns cut off, while destroying roads, bridges, and rail lines, further exacerbating the humanitarian crisis. Lives were lost and cattle were stranded. Preliminary estimates indicate that the cost of the flooding has topped $3 billion, with this number expected to rise.

After a warm and wet start to the winter, eastern Nebraska and western Iowa endured an extended pattern characterized by extremely low temperatures and record-breaking snowfall. By early March, rivers were frozen, frost depths were 60-90 cm deep, and the snow water equivalent of the snowpack was 30 to 100 mm. With these conditions in place, a significant surface cyclone rapidly developed in eastern Colorado and propagated eastward producing significant precipitation across Nebraska and severe weather across portions of the central and eastern United States. Rapid melting of the snowpack due to this rain-on-snow event quickly led to excessive runoff that overwhelmed local rivers and streams. With a blizzard in the west and flooding in the east, including the eventual downriver flooding across eastern Nebraska and western Iowa, the region was brought to a standstill.

In this paper, we will provide an analysis of the antecedent conditions in eastern Nebraska and western Iowa, along with the development of the strong surface cyclone that ultimately triggered the historic flooding. Multiple datasets are utilized, including both in-situ observations and reanalysis data. Understanding the events that led to the flooding could aid in future forecasting efforts.

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